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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Qin Zou

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JONES & SMITH, LLP

2777 ALLEN PARKWAY, SUITE 1000

HOUSTON, TX 77019-2141

EXAMINER

JACKSON, MONIQUE R

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/590,918	Applicant(s) ZOU ET AL.	
	Examiner Monique R. Jackson	Art Unit 1787	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Objections

1. Claims 4, 5, 11, 12, 14 and 19 are objected to because of the following informalities: the term “between from” should probably be “between” or “from” and not the two terms combined.

Appropriate correction is required.

2. Claim 15 is objected to because of the following informalities: “or” on line 2 should be "and" in order to be in proper Markush claim format. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-12 and 15-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Chivukula et al (USPN 6,066,581.) Chivukula et al teach a multilayer ferroelectric thin film composite and a method of making the film composite wherein a precursor sol-gel composition comprising an organic solvent, organic metallic compounds and optionally other organics added as firing additives or to adjust surface tension and viscosity to allow a layer with a controlled thickness to be spin-coated or dip-coated onto a substrate to form thin or thick layers, as required, depending upon a particular application; wherein suitable applications for the composite include ferroelectric capacitors, on a substrate as required (Entire document; particularly Abstract; Col. 11, lines 61-Col. 12, line 38.; Col. 13.) Chivukula et al teach that non-uniformities in the coating may occur due to inadequate control of the viscosity or surface

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tensions of the organic solutions and cracking may occur as a result of stress and defects generated during the heating phase, and that known surface tension and viscosity modifiers utilized in similar sol-gel processes can be added to the sol-gel precursor composition wherein Chivukula et al specifically teach that polyvinylpyrrolidone (PVP) is a known viscosity modifier utilized in the production of similar sol-gel precursor compositions (Col. 3, lines 9-15; Col. 4, lines 33-45; Col. 6, lines 29-62; Col. 7, lines 4-31; Col. 9, lines 29-31; Col. 11, lines 23-35.) Chivukula et al teach that multiple layers can be formed by depositing a first layer on the substrate by spin coating the precursor solution on the substrate, heating the first layer, then depositing subsequent layer and heating again until the desired thickness is obtain, followed by annealing at a temperature of preferably 450°C to 700°C to induce crystallization of the film; wherein a film thickness for a single coat is on the order of 90nm and thicker films of up to 10 micron can be built up from the multiple thin coatings (Col. 9; Col. 17.) Chivukula et al teach that suitable organometallic materials can be selected such that the resulting film layers comprise the same dielectric or ferroelectric materials as instantly claimed including lead zirconate titanate (PZT), lead lanthanum zirconium titanate (PLZT) and barium strontium titanate (BST); wherein Chivukula et al specifically teach a preferred ratio of Zr:Ti of 20:80 to 80:20, preferably 60:40, in the PZT (Entire document; particularly Col. 14, lines 5-14; as in instant Claims 9-12.) Chivukula et al teach that the substrate may be a semiconductor wafer such as a silicone wafer or a metal-coated wafer such as platinum coated wafer (Entire document; particularly Examples.) Hence, with respect to Claims 1 and 19, considering the instant claims do not exclude the buffer layer from being formed from the same materials as the dielectric layer, the Examiner takes the position that the invention taught by Chivukula et al reads upon the claimed invention wherein

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the first thin film taught by Chivukula et al is equated to the claimed "buffer" layer and the remaining film layers, specifically two or more layers, built up to the desired thickness read upon the claimed "dielectric" layer, with the thicknesses reading upon those claimed.

5. Claims 18 and 20 are rejected under 35 U.S.C. 102(b) as anticipated by Zhang et al (*Self-buffered $Ba_xSr_{1-x}TiO_3$ films by sol-gel and RF magnetron sputtering method.*) Zhang et al teach a multilayer ferroelectric thin film composite comprising a thin BST buffer layer of about 50nm formed from a sol-gel precursor composition comprising a solvent and an organometallic compound deposited on a substrate such as Pt/Ti/SiO₂/Si substrate, and a BST film fabricated on the buffer layer wherein the BST film is Ba_{0.8}, Sr_{0.2}TiO₃ having a total thickness of 0.5 or 0.8 microns (500 to 800nm), built up from individual layers having a thickness of about 40nm and formed from a sol-gel composition also comprising a solvent and an organometallic compound (Entire document; Particularly Experimental procedure; Results and discussion.) Zhang et al teach that the coated wet films are baked and then annealed at a temperature of 760°C (Experimental procedure.) Though Zhang et al do not specifically teach the incorporation of a polymeric heterocyclic amide, or more particularly PVP, in the buffer layer precursor sol-gel composition, the Examiner takes the position that the final annealed end product taught by Zhang et al would be the same as the final end product of the instantly claimed invention given that the PVP would be burnt out from the film upon annealing and hence not present in the final dielectric film.

6. Claims 1-12 and 15-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Sakamaki et al (USPN 6,247,799.) Sakamaki et al teach a ferroelectric element comprising a ferroelectric film formed on a substrate without cracks, wherein the film is formed from sol-gel

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precursor solution comprising a metal alkoxide, an organic solvent, and a polymeric binder such as polyvinyl pyrrolidone added to increase the viscosity of the solution (Entire document; particularly Abstract; Col. 4, line 19-Col. 5, line 23.) Sakamaki et al teach that the precursor composition can be coated onto the substrate repeatedly and then annealed to produce a thin-film ferroelectric element having the desired thickness (Col. 5, line 5-Col. 6, line 17.) Sakamaki et al teach that preferred examples of the ferroelectric material is not particularly limited and includes ceramics such as PZT, PLZT and lead magnesium niobate (PMN) and is preferably provided as a thin film having a thickness of submicron thickness for use as a memory or capacitor, or several tens of microns such as 10 to 20 microns for an actuator wherein the thick films are produced without cracking (Entire document; particularly Col. 5, lines 33-45; Col. 10, lines 18-60.)

Sakamaki et al teach that the viscosity of the precursor solution can be adjusted to provide a layer of the desired thickness wherein a viscosity of about 30cps yields a film layer of about 40nm thick, and a viscosity of about 200cps yields a film layer of about 1 micron thick; and preferably no more than 10 layers are successively formed on the substrate and then fired at a temperature of preferably about 500°C to 900°C, more preferably about 700°C to 800°C (Col. 9, lines 33-58; Col. 10.) Sakamaki et al further teach PZT having a ratio of Pb:Zr:Ti:O of

1:0.53:0.47:3 which reads upon the claimed PZT formula (Col. 10, lines 61-66; Examples.)

Sakamaki et al teach the use of quartz and platinum substrates but also teach that the selection range of substrate materials can be broadened since a relatively low firing temperature can be utilized (Examples.) Hence, with respect to Claims 1 and 19, considering the instant claims do not exclude the buffer layer from being formed from the same materials as the dielectric layer, the Examiner takes the position that the invention taught by Sakamaki et al reads upon the

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claimed invention wherein the first thin film taught by Sakamaki et al is equated to the claimed "buffer" layer and the remaining film layers, specifically two or more layers, built up to the desired thickness read upon the claimed "dielectric" layer, with the thicknesses reading upon those claimed.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chivukula et al. The teachings of Chivukula et al are discussed above. Though Chivukula et al teach that the metal oxide composite may comprise niobium or niobates as well as tantalum, Chivukula et al do not specifically teach the bismuth niobate or tantalite composites as claimed. However, one having ordinary skill in the art at the time of the invention would have been motivated to utilize routine experimentation to determine the optimum metal compounds or organometallic compounds to utilize to provide the desired dielectric properties for a particular end use wherein bismuth and zinc are conventional, obvious metals or metal dopants utilized in the art and would have been obvious to one having ordinary skill in the art at the time of the invention given the predictable results and reasonable expectation of success.

9. Claims 1-17 and 19 as well as Claims 18 and 20 (alternatively) are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al in view of Chivuluka et al or Sakamaki et al. The teachings of Zhang et al are discussed above. Though Zhang et al teach the formation of

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a thin buffer layer from a precursor composition and then a dielectric thin film layer formed on the buffer by another precursor composition, Zhang et al do not teach that the precursor composition for the buffer layer further comprise a polymeric heterocyclic amide or more specifically PVP as instantly claimed. However, as discussed above, Chivukula et al teach that PVP may be added to the sol-gel precursor composition as a viscosity modifier and Sakamaki et al also teach that PVP can be added to sol-gel precursor composition as film-forming polymer material or viscosity modifier to prevent cracking. Hence, one having ordinary skill in the art at the time of the invention would have been motivated to incorporate PVP into the buffer layer sol-gel precursor composition taught by Zhang et al to adjust the viscosity and prevent cracking in thicker films as taught by Chivukula et al and Sakamaki et al, utilizing routine experimentation to determine the optimum metallic or organometallic compounds, and number of layers and layer thickness to provide the desired dielectric or ferroelectric material for a particular end use, given the predictable results and reasonable expectation of success, wherein the claimed dielectrics and ferroelectric compounds are conventionally utilized in the art and would have been obvious to one skilled in the art at the time of the invention.

Double Patenting

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined

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application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 1-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-27 of copending Application No. 10/591505. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious to one having ordinary skill in the art at the time of the invention to combine dependent claim limitations and incorporate additional layer(s) to obtain a film having the desired thickness for a particular end use.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monique R. Jackson whose telephone number is 571-272-1508.

The examiner can normally be reached on Mondays-Thursdays, 10:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Callie Shosho can be reached on 571-272-1123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Monique R Jackson/
Primary Examiner, Art Unit 1787
September 12, 2010